Climate Change Driving Financial Innovation: *The Case of Green Bonds*

Andreas Horsch and Sylvia Richter

Andreas Horsch
is a full professor at Technische Universität Bergakademie Freiberg in Freiberg, Germany, where he holds the Chair of Investment & Finance.
andreas.horsch@bwl.tu-freiberg.de

Sylvia Richter
is a research assistant of the Chair of Investment & Finance at Technische Universität Bergakademie Freiberg in Freiberg, Germany.
s.richter@bwl.tu-freiberg.de

The ongoing discussion of sustainability issues, especially climate change and energy and resource scarcity, was followed by the evolving of the sustainable investment market. According to data of the Global Sustainable Investment Alliance (GSIA), sustainable investment assets under management have increased dramatically in recent years, rising from USD 13.3 trillion at the beginning of 2012 to a total of USD 21.4 trillion at the beginning of 2014. And in relation to professionally managed assets, the proportion of socially responsible investments (SRI) has globally increased from 21.5% in 2012 to 30.2% in 2014 (see Nordheim and Voorhes [2015]). As the next GSIA report has not been published yet, consistent global data are hard to obtain. However, the developments of important markets indicate an undiminished growth dynamic of sustainable investments (see Morgan Stanley ISI and Bloomberg [2016] on the U.S. market; and Eurosif [2016] on Europe). At the same time, the systematic and explicit integration of environmental, social, and governance factors into traditional financial analysis became more important, with products like social impact investment funds and green bonds being at the forefront of attention (in detail, see Paula and Della Croce [2015]). Even though market participants seem to be increasingly willing to invest into environmentally sustainable projects, investment needs for green technologies remain considerable: The International Energy Agency [2014] estimated that the total amount of investments needed by 2035 are above USD 50 trillion in order to reduce greenhouse gas emissions far enough that global temperature rise can be limited to 2 degrees Celsius.

As the subsequent discussion of definitions will show, green bonds comply with a broad definition of structured finance according to Davis [2005]. Thus, the aim of the article is to characterize green bonds as a structured finance instrument that could help close the clean energy investment gap by mobilizing private/institutional funds. By using monthly bond price data, the article illustrates special green bond features, which are increasingly interesting for international market participants. Furthermore, an analysis of the historical risk and return profile of green bonds is presented, including the correlation between green bonds and other asset classes, in order to identify whether green investments can help diversify asset portfolios. Potential drivers of bond prices for green bonds will be identified in a separate section using econometric methods.

DEFINING GREEN BONDS

Green bonds are fixed-income securities the proceeds of which will be used to